1. Find the potential difference between the wingtips of a jet airplane induced by its motion through the earth’s magnetic field. The total wing span of the airplane is 40m, its speed is 300 m/s in a region where the vertical component of the earth’s field has the magnitude 3 x 10-5T. (ans. 0.36V)
2. A 12-turn coil 100 mm indiameter has its axis parallel to a magnetic field of 0.5T that is produced by a nearby electromagnet. The current in the electromagnet is cut off, and as the field collapses, an average emf of 8V is induced in the coil. What is the lengthof time required for the field to disappear? (ans. 0.0059s)
3. A circular loop of wire with 50 turns and a radius of 2cm is moved from outside the poles of a horshoe magnet to between the poles in 0.10s. The field between the poles is 0.18T. a) Calculate the average induced emf as the loop moves into the magnetic field. b) How large is the emf if the coil moves out of the field in one half of the tiem? (ans. -0.12V, +0.24V)
4. A circular coil of wire with 10 turns and a 4 cm radius is located between the poles of a large electromagnet that produces a steady magnetic field of 0.50T. The surface of the loop, which is originally parallel to the field is rotated in 0.10s so that its surface is perpendicular to the field. Calculate the average induced emf across the ends of the loop as the coil rotates. (ans. - 0.25V)
5. A rectangular loop that is 10cm long on each side is moved into a uniform magnetic field of 1.5T at a speed of 3m/s. Aline normal to the loops inside area is parallel to the field (upward). A) calculate the induced emf across the ends of the loop as the loop enters the field. b) determine the direction of the induced current. (ans. 0.45V)
6. The 120-V alternating voltage from a wall socket feeds into the primary coil of a toy electric train transformer, which has 800 turns (N1). Calculate the number of turns in the secondary coil so that the output voltage from the transformer is 12V – enough to run a toy electric train safely. (ans. 80 turns)
7. A transformer connected to a 120-V power line has 200 turns in its primary winding and 50 turns in its secondary winding. The secondary is connected to a 100-ohm light bulb. How much current is drawn from the 120-V power line? (ans: 0.075A)
8. Find the power lost as heat when a 10-ohm cable is used to transmit 1000W of electricity at 240V and at 240,000V. (ans. 174W, 1.74x10-4W)
9. Find the potential difference between the wingtips of a jet airplane induced by its motion through the earth’s magnetic field. The total wing span of the airplane is 40m, its speed is 300 m/s in a region where the vertical component of the earth’s field has the magnitude 3 x 10-5T. (ans. 0.36V)
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11. A circular loop of wire with 50 turns and a radius of 2cm is moved from outside the poles of a horshoe magnet to between the poles in 0.10s. The field between the poles is 0.18T. a) Calculate the average induced emf as the loop moves into the magnetic field. b) How large is the emf if the coil moves out of the field in one half of the tiem? (ans. -0.12V, +0.24V)
12. A circular coil of wire with 10 turns and a 4 cm radius is located between the poles of a large electromagnet that produces a steady magnetic field of 0.50T. The surface of the loop, which is originally parallel to the field is rotated in 0.10s so that its surface is perpendicular to the field. Calculate the average induced emf across the ends of the loop as the coil rotates. (ans. - 0.25V)
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